



## 4-H ELECTRICITY AND ELECTRONICS PROJECT



### 4-H THRIVE

#### Help Youth:

#### Light Their Spark

A spark is something youth are passionate about; it really fires them up and gives them joy and energy. Help youth find how this project excites them.

#### Flex Their Brain

The brain grows stronger when we try new things and master new skills. Encourage youth effort and persistence to help them reach higher levels of success.

#### Reach Their Goals

Help youth use the GPS system to achieve their goals.

**Goal Selection:** Choose one meaningful, realistic, and demanding goal.

**Pursue Strategies:** Create a step-by-step plan to make daily choices that support your goal.

**Shift Gears:** Change strategies if you're having difficulties reaching your goal. Seek help from others. What are youth going to do when things get in their way?

#### Reflect

Ask project members how they can use their passion for this project to be more confident, competent, and caring. Discuss ways they can use their skills to make a contribution in the community, improve their character, or establish connections.

Electricity is a form of energy (electromagnetism) harnessed for modern technologies, including electric power and electronics. Youth will learn about the basic principles and theories of electricity and how it is used in vacuum tubes, transistors, integrated circuits, and sensors.

Youth design and construct projects that safely use electricity to accomplish tasks. Youth will

- learn the effects electric energy has on people and their environment
- use and promote safe practices to prevent personal injury and property damage
- learn about efficient use of electric energy through production of heat, light, power communications, and computations
- learn about the generation, transmission, and distribution of electric energy

#### Starting Out *Beginner*

- Discover fundamentals about energy.
- Learn the difference between AC and DC current. Learn how electricity flows through a circuit.
- Find different methods to generate static electricity.
- Learn about electric safety.
- Experiment with basic circuits using batteries, light bulbs, and switches.

#### Learning More *Intermediate*

- Explore different generation methods for electricity (e.g., coal, oil, solar).
- Find information on how and where electricity is generated in your community.
- Learn about the history of electronics, from vacuum tubes to integrated circuits.
- Practice building circuits (e.g., Lectrify or Snap Circuits).

#### Exploring Depth *Advanced*

- Build and compare electric power generators.
- Learn about digital circuit fundamentals, including binary number system, logic gates, and controllers.
- Practice with a soldering iron to attach wiring.
- Design and build a device that requires a microcontroller you need to program (e.g., Arduino, Raspberry Pi, or BeagleBone).

The activities above are ideas to inspire further project development. This is not a complete list.



# Expand Your Experiences!

## Science, Technology, Engineering, and Mathematics

- Find an online virtual circuit simulator and practice building circuits.
- Experiment with efficiencies with different types of power sources.
- Learn the history of electricity generation in America.

## Healthy Living

- Learn about how your body makes and uses electricity.
- Investigate impacts of electricity generation on the environment.
- Build an electronic device to measure physical activity.

## Civic Engagement

- Identify all of the ways you use electricity at home; find ways to reduce electricity use.
- Explore how electricity is transmitted from the power plant to your home.
- Find a community issue that can be solved with the help of an electronic device.

## Leadership

- Become a Junior or Teen Leader.
- Plan, prepare, and present an Engineering Presentation at a 4-H presentation day.
- Lead a circuit building project at a 4-H Club meeting for younger members.

## College and Career Readiness

- Learn about careers that use electronics, and go on a field trip.
- Visit a local community college or university engineering department.

### Resources

- U.S. Department of Energy  
<https://www.energy.gov/science-innovation/stem>
- National Energy Education Development Project  
<http://www.need.org/educators>
- U.S. Energy Information  
<https://www.eia.gov/kids/>
- Sacramento Municipal Utility District  
[www.smud.org/en/Giving-Back-to-Community/Workshops-and-education-resources/Teachers-and-students](http://www.smud.org/en/Giving-Back-to-Community/Workshops-and-education-resources/Teachers-and-students)
- Exploratorium Science Snacks  
[www.exploratorium.edu/snacks/subject/electricity-and-magnetism](http://www.exploratorium.edu/snacks/subject/electricity-and-magnetism)
- No Starch: Electronics for Kids  
<https://nostarch.com/electronicforkids>

The UC 4-H Youth Development Program does not endorse, warrant, or otherwise take responsibility for the contents of unofficial sites.

Connections & Events	Curriculum	4-H Record Books
<p><b>Presentation Days</b> – Share what you’ve learned with others through a presentation.</p> <p><b>Field Days</b> – 4-H members may participate in a variety of contests related to their project area.</p> <p>Contact your UC Cooperative Extension office to determine additional opportunities available, such as a field day.</p>	<ul style="list-style-type: none"> <li>• Electric Excitement <a href="https://shop4-h.org/products/electric-excitement-curriculum-1-magic-of-electricity">https://shop4-h.org/products/electric-excitement-curriculum-1-magic-of-electricity</a></li> <li>• Power of the Wind <a href="https://shop4-h.org/products/power-of-wind-curriculum-books-materials-kit-bundle">https://shop4-h.org/products/power-of-wind-curriculum-books-materials-kit-bundle</a></li> <li>• Junk Drawer Robotics Lvl 3,1 <a href="https://4-h.org/parents/curriculum/robotics/">https://4-h.org/parents/curriculum/robotics/</a></li> <li>• Exploratorium Tinkering Studio Projects <a href="http://www.exploratorium.edu/tinkering/projects">www.exploratorium.edu/tinkering/projects</a></li> </ul>	<p>4-H Record Books give members an opportunity to record events and reflect on their experiences. For each project, members document their experiences, learning, and development.</p> <p>4-H Record Books also teach members record management skills and encourage them to set goals and develop a plan to meet those goals.</p> <p>To access the 4-H Record Book online, visit <a href="http://ucanr.edu/orb/">http://ucanr.edu/orb/</a>.</p>





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